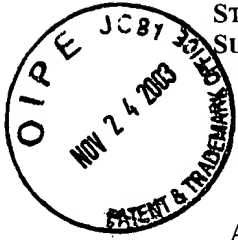


U.S. PATENT APPLICATION SERIAL No.: 09/709,935  
ATTORNEY DOCKET NO.: 23439-054-402  
STATEMENT OF FACTS  
SUBMITTED: NOVEMBER 24, 2003



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE PATENT APPLICATION OF: John DiDomenico *et al.*  
SERIAL NO.: 09/709,935  
ATTORNEY DOCKET NO: 23439-054-402  
FILING DATE: November 13, 2000  
ART UNIT : 3747  
EXAMINER *Not Yet Assigned*  
FOR: REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION

---

**STATEMENT OF FACTS IN SUPPORT OF**  
**FILING ON BEHALF OF NON-SIGNING INVENTORS**

**Mail Stop Petition**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA. 22313-1450

Dear Sir:

This is a statement of the facts relied upon to establish the diligent efforts to secure the execution of the Joint Declaration For Patent Application by the non-signing inventors, JAMES JOHNSON and JOHN DIDOMENCIO, for the above identified patent application.

The information set forth in this Statement is made by a person with first-hand knowledge of the facts recited therein.

I, BRADFORD C. BLAISE, declare that:

1. JAMES JOHNSON has refused, either explicitly or by conduct, to execute a Joint Declaration For Patent Application.
2. On August 5, 2003, I caused a package to be sent, via Fed Ex Priority Overnight, to JAMES JOHNSON's last known home address, enclosing:

(1) a Letter addressed to JAMES JOHNSON outlining his obligations to his former employer Environmental Systems Products Holdings Inc. (hereinafter "ESPH" or "ESP"), and requesting that he reply by August 20, 2003; (2) a Copy of U.S. Patent Application Serial No. 09/709,935 entitled: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION," including drawing figures 1-2; (3) a Joint Declaration for Patent Application and Power of Attorney; (4) an Assignment; and (5) a Federal Express Return Envelope. A copy of each of the aforementioned documents together with the Federal Express shipping label are provided in attached **TAB A**.

3. Using Federal Express' "Track Shipments" feature provided at [www.fedex.com](http://www.fedex.com), I was able to obtain a delivery confirmation (see **TAB B**) to JAMES JOHNSON's last known home address at 9:10 am on August 6, 2003.
4. To date, JAMES JOHNSON has made no contact regarding this package of information, nor has any executed Joint Declaration for Patent Application been returned by JAMES JOHNSON.

\*\*\*\*\*

5. JOHN DIDOMENICO has refused, either explicitly or by conduct, to execute a Joint Declaration For Patent Application.
6. On August 5, 2003, I caused a package to be sent, via Fed Ex Priority Overnight, to JOHN DIDOMENICO's last known home address, enclosing: (1) a Letter addressed to JOHN DIDOMENICO outlining his

obligations to his former employer ESPH and requesting that he reply by August 20, 2003; (2) a Copy of U.S. Patent Application Serial No. 09/709,935 entitled: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION," including drawing figures 1-2; (3) a Joint Declaration for Patent Application and Power of Attorney; (4) an Assignment; and (5) a Federal Express Return Envelope. A copy of each of the aforementioned documents together with the Federal Express shipping label are provided in attached TAB C.

7. Using Federal Express' "Track Shipments" feature provided at www.fedex.com, I was able to obtain a delivery confirmation (see TAB D) to JOHN DIDOMENICO's last known home address at 9:47 am on August 6, 2003.
8. Subsequently, I received the Federal Express Return Envelope from JOHN DIDOMENICO which included each of the original documents referenced in paragraph six (6) above. The Joint Declaration for Patent Application and Power of Attorney were returned un-signed. A letter dated August 11, 2003 (TAB E) including an attachment (a portion of which has been redacted as it is not germane to the above-identified patent application) was also included in the Federal Express Return Envelope and was signed by JOHN DIDOMENICO.
9. In the first paragraph of JOHN DIDOMENICO's August 11, 2003 letter (TAB E), Mr. DIDOMENICO clearly acknowledges his responsibility under his agreement with ESP to assist in patent issues, and he further

states his belief that he is not required to assist without compensation. In the second paragraph, he indicates that he would be willing to quote a cost for reviewing this application or future applications.

10. During the time period extending approximately from late August 2003 through early November, 2003, James G. Gatto (another Attorney at Mintz Levin) and I worked with ESPH on a proposed Consultant Agreement whereby former ESPH employees who are inventors on one or more of ESPH's pending patent applications (including JOHN DIDOMENICO) would be paid an hourly rate for Consulting Services. Consulting Services proposed under the Agreement would include, for example, reviewing ESPH patent applications for content and technical accuracy, assisting in the review of Office Actions received from the U.S. Patent Office, and analyzing references relied upon by Patent Examiners in Office Actions.
11. After a draft of the Consultant Agreement was approved by ESPH, I composed and transmitted an e-mail correspondence (see **TAB F**) to JOHN DIDOMENICO on November 18, 2003 apprising him of ESPH's willingness to pursue a Consultant Agreement. Note that CRAIG RENDAHL was also included on this e-mail, as ESPH is interested in obtaining his assistance on other pending patent applications for which he is a named inventor.
12. On November 20, 2003, I received an e-mail correspondence from JOHN DIDOMENICO (see **TAB G**) wherein he indicated that he wished to receive and review a draft of the Consultant Agreement.

13. In response, I composed and transmitted an e-mail correspondence (see TAB H) on November 20, 2003 to JOHN DIDOMENCIO and attached a copy of the draft Consultant Agreement.
14. Subsequently on November 20, 2003, I received an e-mail correspondence from JOHN DIDOMENICO (see TAB I), wherein he recited that he found the agreement "*markedly restrictive and confining*" and had "*no interest in going forward with this agreement at this time.*" See TAB I.
15. Despite acknowledging his responsibility under his agreement with ESPH to assist in patent issues (see paragraph 9 above, and TAB E), and ESPH's willingness to accommodate JOHN DIDOMENICO's request for compensation through a proposed Consultant Agreement, JOHN DIDOMENCIO has expressly declined to assist us (see paragraph 14 above, and TAB I).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: November 24, 2003

  
\_\_\_\_\_  
Bradford C. Blaise  
Registration No. 47,429

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY, AND POPEO, PC  
12010 Sunset Hills Road - Suite 900  
Reston, Virginia 20190  
(703) 464-4800 (Telephone)  
(703) 464-4895 (Facsimile)

**REQUEST FOR RECONSIDERATION OF PETITION UNDER 37 C.F.R. §1.47(b)**

In response to the Decision on Petition Under 37 C.F.R. §1.47(b) (“Decision”), mailed May 22, 2003, Petitioner respectfully submits the remarks set forth below.

A. **37 C.F.R. §1.47(a)**

In the time period following the receipt of the Decision, one of the three named inventors for the above-identified application, Craig Rendahl, has executed both a joint declaration in compliance with 35 U.S.C. §1.116, and an Assignment granting his entire right, title, and interest in the above-identified application to Environmental Systems Products Holdings Inc.

Accordingly, Petitioner must now complete the filing requirements pursuant to 37 C.F.R. §1.47(a), which reads: “If a joint inventor refuses to join in an application for patent or cannot be found or reached after diligent effort, the application may be made by the other inventor on behalf of himself or herself and the nonsigning inventor. The oath or declaration in such an application must be accompanied by a petition including proof of the pertinent facts, the fee set forth in §1.17(h), and the last known address of the non-signing inventor. The nonsigning inventor may subsequently join in the application by filing an oath or declaration complying with §1.63.”

As such, and in addition to the information provided with the original Petition filed September 4, 2001, Petitioner submits the following in support of the Request for Reconsideration of Petition Under 37 C.F.R. §1.47(b):

- A “Joint Declaration for Patent Application” executed by Craig Rendahl on August 6, 2003 (*see TAB A*);
- An Assignment executed by Craig Rendahl on August 8, 2003 granting his entire right, title, and interest in the above-identified application to Environmental Systems Products Holdings Inc. (*see TAB B*);
- A declaration of Mr. Niranjana Vescio indicating that the filing is necessary to preserve the rights of the parties and prevent irreparable damage (*see TAB C*); and
- A Statement of Facts in Support of Filing on Behalf of the Non-Signing Inventors [*with attachments satisfying the requirements of 37 C.F.R. §1.47(a)*] filed herewith.
- The last known addresses of the non-signing inventors are set forth below, as well as in the “Statement of Facts” filed herewith.

James Johnson  
4401 W. Crestview Road  
Tucson, AZ. 85745

John DiDomenico  
8810 East Bear Paw Place  
Tucson, AZ. 85749

**CONCLUSION**

On the basis of the foregoing, the Petitioner respectfully requests the granting of this Request for Reconsideration so that the application will be taken up promptly, and respectfully solicit favorable examination at that time.

Respectfully submitted,

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY, AND POPEO, PC

By:

  
Bradford C. Blaise  
Registration No. 47,429

Date: **November 24, 2003**

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY, AND POPEO, PC  
12010 Sunset Hills Road  
Suite 900  
Reston, Virginia 20190  
(703) 464-4800 (Telephone)  
(703) 464-4895 (Facsimile)



**JOINT DECLARATION FOR PATENT APPLICATION**

As the below named inventors, we hereby declare that:

Our residence, post office addresses and citizenship are as stated below next to our names;

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION**, the specification of which

( ) is attached hereto.

(X) was filed on **November 13, 2000** as Application Serial Number **09/709,935** and was amended on

(if applicable)

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

**Prior Foreign Application(s)**

We hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Country	Application Number	Date of Filing (day, month, year)	Date of Issue (day, month, year)	Priority Claimed Under 35 U.S.C. 119
				Yes <input type="checkbox"/> No <input type="checkbox"/>
				Yes <input type="checkbox"/> No <input type="checkbox"/>

**Prior United States Provisional Application(s)**

We hereby claim the benefit under 37 C.F.R. §119(e) of any United States provisional application(s) listed below:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
60/100,913	09-17-1998	Pending

**RECEIVED****NOV 26 2003****OFFICE OF PETITIONS**

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

## Prior United States Application(s)

We hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
09/398,199	09-17-1999	Abandoned
09/520,166	03-07-2000	Abandoned

I hereby appoint the attorneys and/or agents associated with Mintz Levin Cohn Ferris Glovsky & Popeo,

Customer Number

29315

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

---

Please address all telephone calls to **James G. Gatto** at telephone number 703-464-4800.

Please address all correspondence to Customer number:

29315

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of Second Inventor **JOHNSON** **James**  
Family Name First Given Name Second Given Name

Residence **4401 W. Crestview Road, Tucson, Arizona 85745**

Citizenship **U.S.A.**

Post Office Address **Same as above**

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of First Inventor **DIDOMENICO** **John**  
Family Name First Given Name Second Given Name

Residence **8810 East Bear Paw Place, Tucson, Arizona 85749**

Citizenship **U.S.A.**

Post Office Address **Same as above**

Signature  \_\_\_\_\_ Date **06 AUG 2003**

Full Name of First Inventor **Rendahl** **Craig** **S.**  
Family Name First Given Name Second Given Name

Residence **9307 N. Desert Monsoon Pl., Marana, Arizona 85743-7533**

Citizenship **U.S.A.**

Post Office Address **Same as above**

RES 98564v1

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

**ASSIGNMENT**

WHEREAS, **James Johnson**, a citizen of the United States of America, residing at 4401 W. Crestview Road, Tucson, AZ 85745; **John DiDomenico**, a citizen of the United States of America, residing at 8810 East Bear Paw Place, Tucson, AZ 85749; and **Craig S. Rendahl**, a citizen of the United States of America, residing at 9307 N. Desert Monsoon Pl., Marana, AZ 85743-7533 (hereinafter "Assignor" or "Assignors"), have made an invention entitled:

**"REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION"**

described in the application for United States Letters Patent filed on November 13, 2000, and assigned **U.S. Application Serial No. 09/709,935**; and

WHEREAS, **Environmental Systems Products Holdings Inc.** (hereinafter "Assignee"), a Delaware corporation having a place of business at 11 Kripes Road, East Granby, Connecticut 06026, is desirous of acquiring the entire right, title and interest in and to the aforesaid invention, applications and all Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor;

NOW THEREFORE, in consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the said assignors, by these presents do sell, assign and transfer unto Assignee, its successors, legal representatives and assigns, the full and exclusive right in and to the said invention as described in the said application, and in and to any Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor and all rights to claim priority on the basis of said application;

AND WE HEREBY authorize and request the Commissioner of Patents and Trademarks or any other proper officer or agency of any country to issue all said Letters Patent to said Assignee;

AND WE HEREBY warrant and covenant that we have the full right to convey the entire interest herein assigned and that we have not executed and will not execute any instrument or assignment in conflict herewith;

AND WE HEREBY authorize any attorney and/or agent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, PC, to insert any information necessary to ensure that this Assignment is complete upon submission to the United States Patents and Trademark Office;

AND WE HEREBY agree to communicate to said Assignee or its representatives any facts known to us respecting said invention, to execute all divisional, continuation, reissue, reexamination, extension, substitute and foreign applications, sign all lawful documents and make all rightful oaths and declarations relating to said invention, execute and deliver any and all papers that may be necessary or desirable to perfect the title to this invention in said Assignee, its successors, legal representatives or assigns, and to testify in any judicial or administrative proceeding and generally do everything possible to aid the said Assignee to obtain and enforce said Letters Patent in the United States or any foreign country when requested so to do by said Assignee.

Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**James Johnson**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **James Johnson**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires:

\_\_\_\_\_

Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**John DiDom nico**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **John DiDomenico**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

Signature of Inventor:  
Inventor's Name:

  
Craig S. Rendahl

Date of Execution:

08 AUG 2003

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of                                 )  
  ) ss:  
  )

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **Craig S. Rendahl**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)



Constance M. McKay  
Notary Public

My commission expires: 5-12-2006

RES 98561v1



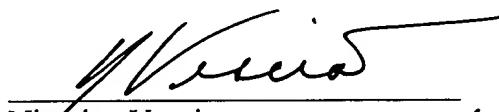
### **Declaration of Niranjan Vescio**

I, Niranjan Vescio, hereby declare the following:

1. I am an employee of Envirotech Systems Corporation (ESC). My responsibilities include monitoring competitors.
2. On information and belief, John DiDomenico, and Craig S. Rendahl are employed by SPX Corporation (SPX) to develop products that directly compete with ESC products.
3. On information and belief, James H. Johnson was employed by MD LaserTech, LTD. (MD Laser) to develop products that compete with ESC products.
4. I have personally witnessed presentations, obtained promotional material and had discussions with other industry personnel that substantiate my belief that SPX and MD Laser are developing competing products.
5. At the 2000 CRC conference in San Diego, California, I personally witnessed Mr. Rendahl deliver a presentation in which he highlighted various aspects of SPX's plan to design, manufacture and market a remote sensing device to compete against ESP products.
6. At the 2001 CRC conference, I witnessed SPX present a poster that described progress made in the development of their remote sensing device. At that conference I witnessed Mr. John DiDomenico, as chief engineer for SPX, describe some of SPX's technical achievements. I also witnessed Dr. Glan Sachse, a NASA collaborator, elaborate on some of the technical aspects of SPX's products which are being developed to compete against ESP's remote sensing device.

7. I have visited the SPX website page (<http://www.shareholder.com/spx/news/20000719-18037.cfm>) (copy attached) that announces SPX's license to use NASA technology to develop a remote sensing device which will compete against ESP products. This same announcement quotes Mr. Rendahl as saying "we expect to begin manufacturing a highly enhanced remote sensing device before the end of 2001."
8. I have visited the MD Laser website (<http://www.md-lasertech.com/profile.html>) (copy attached) that describes MD Laser's products that are designed to compete with ESP products.
9. I have obtained a promotional CD-ROM disk that describes SPX's interest in developing a remote sensing device that competes with ESP products.
10. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: Aug. 1, 2001

  
Niranjana Vescio  
Title: Technical Marketing Director

**SPX Corporation**

SPX

SPW \$116.25 +1.5 4:03 PM ET - Sep 3

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## Press Releases

### SPX Service Solutions to Adapt Nasa Satellite Technology to Monitor Vehicle Pollution

KALAMAZOO, MICHIGAN - JULY 19, 2000 – SPX Service Solutions, a unit of SPX Corporation (NYSE:SPW) today announced that it has received the exclusive license to use patented NASA technology for use in developing a new remote sensing device to monitor motor vehicle exhaust.

Cities and states may soon have a new high-tech tool in the battle against automotive air pollution, thanks to NASA satellite technology originally developed to track global greenhouse gases and the Earth's protective ozone layer. As envisioned, NASA's atmospheric remote sensing technology will be adapted to an autonomous roadside system to monitor motor vehicle emissions.

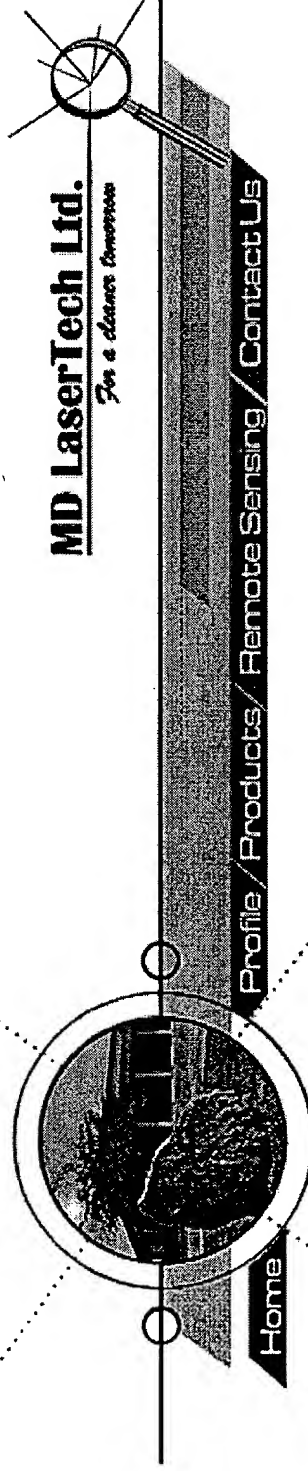
Cars and trucks will pass through a low-power light beam, without stopping or slowing down. Space-age sensor technology will instantly analyze vehicle exhaust pollutants important to local and state governments working to meet federally mandated air quality standards.

"Taking an accurate reading of several exhaust products as a car passes by is a formidable challenge. We want to take a measurement of all the gases of interest every one thousandth of a second over a period of a half-second. Fortunately, our newest remote sensing technology has that capability," said Glen Sachse, senior research scientist at NASA Langley Research Center, Hampton, VA. Sachse is one of six team members who invented the highly sensitive electro-optical system at the core of the technology.

"Remote testing of vehicle exhaust will provide governments around the world with a fast, efficient and low-cost method to identify and reduce motor vehicle air pollution and greenhouse gases, which account for approximately half of all air pollution," said Craig Rendahl, Remote Sensing business leader for SPX Service Solutions.

"With the number of vehicles on the road increasing every year, we believe there is a significant global market for technology of this nature," said Rendahl. "SPX will offer a basic unit which will be available at the end of 2000. With the help of NASA, we expect to begin manufacturing a highly enhanced remote sensing device before the end of 2001. This second-generation product will contain many other features, including the capability to test heavy-duty diesel vehicles."

# Remote Sensing Systems

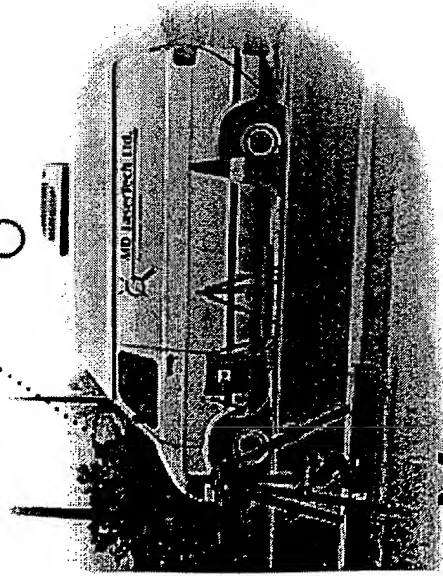


## Company Profile

MD LaserTech was founded in 1998 to provide high quality remote sensing services and technology to states and government agencies as a complement their vehicle emissions control programs.

Highly experienced remote sensing and emissions systems development personnel founded MD LaserTech. The team has many years experience in the development, deployment, manufacture and operation of vehicle emissions testing and remote sensing technology and equipment.

MD LaserTech offers the industry's most advanced remote sensing systems for 2-Gas, 4-Gas and diesel opacity emissions analysis. In addition to products for emissions applications, MD LaserTech also offers advanced remote sensing systems for speed limit enforcement.



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From: Martha Spetz (703)464-4813  
MINTZ LEVIN COHN FERRIS GLOVSK  
12010 SUNSET HILLS RD  
Ste 900  
RESTON, VA, 20190

**FedEx.****To: Mr. James Johnson (520)298-7306****4401 W. Crestview Road****Tucson, AZ, 85745**

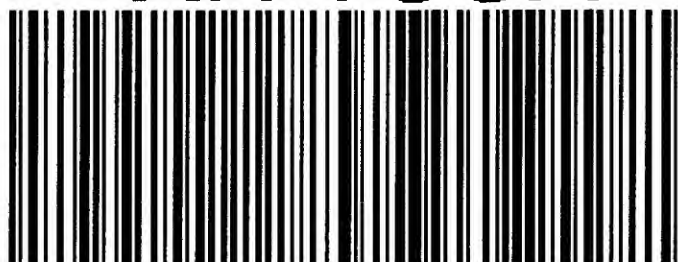
Ref: 23439-054-402

SHIP DATE: 05AUG03  
WEIGHT: 1 LBS

RELEASE# 3785346



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**06AUG03****85745-AZ-US****XH TUSA**

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on [fedex.com](http://fedex.com). FedEx will not be responsible for any claim in excess of \$100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of \$100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is \$500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our Service Guide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

12010 Sunset Hills Road, Suite 900  
Reston, Virginia 20190-5839

Bradford C. Blaise, Esq.

Direct dial 703 464 8130  
bcblaise@mintz.com

703 464 4800  
703 464 4895 fax

August 5, 2003

Via Federal Express

CONFIDENTIAL

Mr. James Johnson  
4401 W. Crestview Road  
Tucson, Arizona 85745

**RECEIVED**

NOV 26 2003

**OFFICE OF PETITIONS**

Re: U.S. Patent Application  
Serial No.: 09/709,935  
Inventor(s): John DiDomenico, Craig S. Rendahl, James Johnson  
Title: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION"  
Filed: November 13, 2000

Dear Mr. Johnson,

As you know, Environmental Systems Products Holdings Inc. (ESPH) has filed a series of patent applications for which you are a named inventor.

In particular, the above-referenced patent application was filed with the U.S. Patent Office on November 13, 2000 naming you as an Inventor. A copy of the above-referenced patent application, as-filed, is enclosed for your review.

Also enclosed are: (1) Joint Declaration and Power of Attorney; and (2) Assignment. At this time, we request that you execute the Declaration and Power of Attorney and Assignment documents, and return them to us as soon as possible for filing with the U.S. Patent and Trademark Office. For your convenience, I have enclosed a self-addressed Federal Express envelope for expeditious return.

Patent rights and the administrative procedures for securing patent rights are costly and time sensitive. Any delay on your part may generate additional expenses for ESPH and could jeopardize the company's valuable patent rights. I also remind you of your continuing duty, pursuant to your former employment, to assist ESPH in securing its rights. Accordingly, we request a response by Wednesday, August 20, 2003. If we receive no response from you by this date, we will consider it a refusal to sign.

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.

Mr. James Johnson

August 5, 2003

Page 2

If you have any questions regarding this matter, please do not hesitate to contact me at the telephone number listed above.

Very truly yours,

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.



Bradford C. Blaise, Esq.

BCB/mrs

Enclosures:

- Copy of U.S. Patent Application Serial No. 09/709,935 titled: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION," including drawing figures 1-2.
- Joint Declaration for Patent Application and Power of Attorney
- Assignment
- Federal Express Return Envelope

RES 98551v1

## REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION

### Field of the Invention

Remote emissions sensing system and method with improved nitrous oxide (NO<sub>x</sub>) detection, including processing to account for the presence of ambient NO<sub>x</sub>.

### Background of the Invention

5 Remote emissions sensing systems generally are known. One such system comprises a source of electromagnetic radiation arranged to pass a beam of radiation through the exhaust plume of a motor vehicle as the motor vehicle passes by the system, and one or more detectors arranged to receive the radiation after it passes through the exhaust plume of the vehicle. A filter may be associated with one or more detectors to enable the detector to determine the intensity of  
10 electromagnetic radiation having a particular wavelength or range of wavelengths. The wavelengths may be conveniently selected to correspond to wavelengths absorbed by molecular species of interest in an exhaust plume (e.g., HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, or other molecular species). The one or more detector output voltages that represent the intensity of the electromagnetic (em) radiation measured by that detector. The voltages are input to a processor. The processor  
15 calculates the difference between the known intensity of the light source and the intensity detected by the detectors to determine the amount of absorption by particular molecular species (based on predetermined wavelengths associated with that species). Based on the measured absorption(s), the concentration of one or more molecular species in the emissions may be



determined in a known manner. For various reasons, inaccuracies can occur when remotely sensing emissions.

Some remote emission sensing systems do not have the capability to detect  $\text{NO}_x$ . Other systems detect  $\text{NO}_x$ , but suffer from various drawbacks. One problem is that when detecting the  $\text{NO}_x$  concentration present in an exhaust plume, the presence of ambient  $\text{NO}_x$  can adversely affect the accuracy of the detected concentration. For example, if two cars pass a test station within a relatively short time period,  $\text{NO}_x$  emissions from the first car may linger and be mixed with the exhaust plume of the second car thereby skewing the measurement of  $\text{NO}_x$  concentration of the second car. Other sources of ambient  $\text{NO}_x$  may lead to a similar result.

A second problem arises due to variations in light source intensity. Generally, to detect the  $\text{NO}_x$  concentration in an exhaust plume, the output of a detector adapted to determine the amount of absorption of the light beam due to the presence of  $\text{NO}_x$  is compared to a value indicative of the intensity of the light source, with the difference representing the amount of absorption due to the presence of  $\text{NO}_x$ .

Typically, a standard value is used for the light source intensity. However, variations in the actual intensity of the source can cause inaccuracies in the detected amount of  $\text{NO}_x$ . A third problem arises due to the presence of noise. Other problems and drawbacks exist.

#### Summary of the Invention

One object of the invention is to overcome these and other limitations, problems and drawbacks of prior systems and methods.

Another object of the present invention is to increase the reliability and accuracy of  $\text{NO}_x$

readings taken in a remote emissions sensing system.

Another object of the invention is to improve the accuracy of  $\text{NO}_x$  emissions readings by accounting for the presence of ambient  $\text{NO}_x$ .

Another object of the invention is to improve the accuracy of  $\text{NO}_x$  emissions readings by accounting for the presence of ambient noise.

It is another object of the invention to improve the processing efficiency of  $\text{NO}_x$  concentration calculations.

These and other objects of the invention are accomplished according to various embodiments of the present invention. According to one embodiment of the present invention a remote emissions sensing system is provided with  $\text{NO}_x$  detection capability. Ideally, the  $\text{NO}_x$  detected is the  $\text{NO}_x$  present in the exhaust plume emanating from a motor vehicle being tested. To account for ambient  $\text{NO}_x$  (for example, from a previous car), for each vehicle whose exhaust is measured, an ambient  $\text{NO}_x$  concentration reading is taken. Preferably, a "blocked" beam reading is also taken prior to exhaust plume measurement. The ambient and blocked beam readings are both subtracted from the exhaust plume reading to render a more accurate exhaust concentration reading.

Additionally, the system may be configured to process exhaust plume readings only in a predetermined wavelength band associated with the known absorption spectrum of  $\text{NO}_x$ .

The above and other objects, features and advantages of the present invention will be better understood from the following detailed description of the invention.

#### Brief Description of the Drawings

Figure 1 depicts a schematic representation of intensity versus wavelength data for one embodiment of the invention.

Figure 2 depicts a schematic representation of intensity versus wavelength data for another one embodiment of the invention.

5 Detailed Description of the Invention

According to one embodiment, the emissions detection may be performed by a remote sensing device, such as RSD-1000 or RSD-2000, manufactured by RSTi, Tucson, Arizona.

Typically, the remote sensing device and analyzer system includes at least one source of radiation (*e.g.*, infrared (IR), ultra-violet (UV), etc.), at least one detector of radiation, and a  
10 processor to process the detected radiation signals. According to one embodiment of the invention, the radiation emitted by the source(s) may be directed across a roadway along a predetermined path. In some embodiments, additional optics or beam directing devices may be used to re-direct the beam of radiation. Ultimately, the source radiation is received by the detector(s). Other system configurations may also be used. When a vehicle passes along  
15 roadway, the source beam(s) may pass through an exhaust plume of the vehicle.

The detector(s) record the presence of various exhaust constituents (*e.g.*, HC, CO<sub>2</sub>, CO, NO<sub>x</sub>, etc.), typically, by recording a voltage level indicative of the amount of absorption of the source beam. The processor, in part, performs an analysis of the plume to analyze the exhaust emissions in a known manner.

20 According to one embodiment of the present invention, the remote emission detector (RSD) system takes a reading of the ambient NO<sub>x</sub> concentration present just prior to each vehicle passing through the system. As the vehicle is passing through the system, the RSD system takes

a "blocked" reading (i.e., a reading when the vehicle is located in the path of the beam between the source and detector). This reading may reflect any ambient or system noise which may be present. The RSD system also takes a reading of the exhaust plume as the beam passes through the plume. Thus, in accordance with a one embodiment of the present invention, for each vehicle  
5 whose  $\text{NO}_x$  reading is to be taken, at least three measurements are made, including an ambient concentration reading, a "blocked" reading and an exhaust plume reading. Since the ambient concentration and noise can vary from test to test, detecting the ambient  $\text{NO}_x$  concentration and noise for each test can permit more accurate and reliable  $\text{NO}_x$  concentration determinations to be made.

10 Each of the readings is made by one or more detectors. The outputs of the detector(s), reflecting the ambient  $\text{NO}_x$  reading, the blocked beam reading and the exhaust plume reading (and other desired data), are provided to a processor. The processor determines the ambient concentration of  $\text{NO}_x$  and the concentration of  $\text{NO}_x$  from the exhaust plume and subtracts the ambient concentration from the  $\text{NO}_x$  concentration from the plume for each vehicle tested.

15 Preferably, the blocked beam reading for each vehicle is subtracted from the exhaust plume reading for that vehicle to remove ambient and or system noise to further improve the accuracy and or reliability of the test results.

Each of the readings and the process and system for obtaining reliable  $\text{NO}_x$  readings in connection with a remote sensing system will now be discussed in more detail. Initially, as the  
20 vehicle approaches the light beam, the baseline ambient concentration reading is taken. In connection with this step the detector measures the ambient  $\text{NO}_x$  concentration just prior to the vehicle's entry into and through the light beam. The baseline ambient concentration readings

may be scheduled to occur periodically when no vehicle or emissions source is within detection range. Thus, the most recent reading for ambient concentration may be stored and used in connection with the concentration calculation for each vehicle. Alternatively, a trigger event may cause the RSD system to take the ambient concentration reading. In either case, the readings are preferably obtained by taking a plurality of samples at short intervals over a predetermined measurement interval. For example, an ambient reading may comprise 50 samples at 10 ms intervals over a 0.5 second measurement interval.

Once a vehicle breaks the light beam, a "blocked" reading or "dark current" reading, may be performed. This reading measures baseline current and noise in the system. The baseline values may change during the course of the day as it is dependent upon, for example, ambient temperature. The "blocked" reading is taken for each vehicle for which an  $\text{NO}_x$  reading is desired. Preferably, the blocked reading is taken after the ambient concentration reading but prior to the exhaust plume reading. The exhaust plume reading is taken based upon the actual emissions from each vehicle to be measured, in a known manner.

One embodiment of the present invention incorporates certain data processing routines conveniently chosen to increase the accuracy and validity of resulting  $\text{NO}_x$  concentrations. Figure 1 depicts a typical data plot that may result from an absorption measurement of  $\text{NO}_x$ . The Y axis contains radiation intensity values and the X axis contains radiation wavelength values. An absorption of radiation will typically appear as a dip in the signal at particular wavelengths. For example, absorption of NO will typically occur centered substantially around wavelengths of 326 nm. In a known manner, exhaust emission data is typically normalized or ratioed by comparison with another exhaust constituent (e.g.,  $\text{CO}_2$ ). Certain existing systems may ratio

using data corresponding to a range of wavelengths indicated by bracket A on Fig. 1. As can be seen, this range includes many data points for which there is no significant absorption of  $\text{NO}_x$ .

Thus, any noise or other inaccuracies present in these non-absorptive wavelengths may lead to erroneous results in determining the concentration of  $\text{NO}_x$  in the exhaust emissions. The present invention reduces errors of this sort by selecting a convenient range of wavelengths over which to ratio. For example, as shown in Fig. 1, a range of wavelengths, indicated by bracket B and substantially centered around an absorption dip may be used to calculate a ratio.

The present invention also compensates for changes in the intensity of the radiation to calculate a more accurate  $\text{NO}_x$  concentration. Fig. 2 depicts two absorption signals (indicated as "a" and "b" in Fig. 2) for two measurements of  $\text{NO}_x$  concentration. The apparent shift in the curves may be caused by a variety of reasons. For example, as ambient conditions (e.g., air temperature, humidity, etc.) change, the intensity may also change and cause a shift in the detected signal. The present invention compensates for such an effect by subtracting a baseline intensity from each signal. The baseline intensity may be calculated by a variety of methods. For example, a substantially linear region (indicated as "c" and "d" on Fig. 2) may be used to obtain a baseline intensity level. Thus, each measurement will preferably have a baseline corresponding to the identical conditions during which the measurement was taken and a more accurate determination of  $\text{NO}_x$  concentration may be calculated.

Other embodiments and uses of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. The specification and examples should be considered exemplary only.

I claim:

1. A method for remote emissions sensing with NO<sub>x</sub> detection capability comprising the steps of:

taking an ambient reading of ambient NO<sub>x</sub> concentration present prior to a vehicle

5 passing by a system for remote emissions sensing;

taking an exhaust plume reading of an exhaust plume of the vehicle as the vehicle passes by the system for remote emissions sensing; and

subtracting the ambient NO<sub>x</sub> concentration reading from the exhaust plume reading to provide a concentration reading for the NO<sub>x</sub> present in the vehicle emissions.

10 2. The method of claim 1 further comprising the steps of taking a blocked beam reading prior to taking an exhaust plume reading and when the vehicle is in the path of a source beam of the system; and

subtracting the blocked beam reading from the exhaust plume reading.

15 3. The method of claim 2, wherein the ambient reading is taken at predetermined intervals and wherein the most recent reading is stored and used in connection with the blocked beam and exhaust plume readings for each vehicle.

4. The method of claim 1, wherein the ambient reading is taken at an occurrence of a predetermined trigger event.

20 5. The method of claim 2, wherein the blocked beam reading measures baseline current or noise in the system and wherein the blocked beam reading is taken after the ambient reading but before the exhaust plume reading.

6. The method of claim 1, wherein a range of wavelengths substantially centered around a characteristic wavelength is selected over which to take readings so that the number of data points for which there is no significant NO<sub>x</sub> absorption is minimized.

7. The method of claim 1, further comprising the step of subtracting a baseline  
5 intensity from each exhaust plume reading to compensate for changes in radiation intensity.

8. The method of claim 6, wherein the baseline intensity is calculated using a substantially linear region over an absorption dip.

9. The method of claim 2, wherein the ambient reading is taken just prior to the blocked beam reading.

10 10. A system for remote emissions sensing with NO<sub>x</sub> detection capability comprising:  
a source beam of radiation;  
a means for taking an ambient reading of ambient NO<sub>x</sub> concentration present prior  
to a vehicle passing by the system;  
a means for taking an exhaust plume reading of an exhaust plume of a vehicle; and  
15 a means for subtracting the ambient NO<sub>x</sub> concentration reading from the exhaust  
plume reading.

11. A system as claimed in claim 10 further comprising a means for taking a blocked  
beam reading when the vehicle is in the path of the source beam; and  
a means for subtracting the blocked beam reading from the exhaust plume reading.

20 12. The system of claim 10, wherein the ambient reading is taken periodically at  
predetermined intervals and the most recent reading is stored and used in connection with the  
exhaust plume reading for each vehicle.



13. The system of claim 10, wherein the ambient reading is taken at the occurrence of a predetermined trigger event.

14. The system of claim 11, wherein the blocked beam reading measures baseline current or noise in the system, and where the blocked beam reading is taken after the ambient  
5 reading but before the exhaust plume reading.

15. The system of claim 10, wherein a range of wavelengths substantially centered around a characteristic wavelength is selected over which to take readings so that the number of data points for which there is no significant  $\text{NO}_x$  absorption is minimized.

16. The system of claim 10, wherein changes in the intensity of the source radiation are  
10 compensated by subtracting a baseline radiation intensity from each exhaust plume reading.

17. The system of claim 16, wherein the baseline intensity is calculated using a substantially linear region over an absorption dip.

Abstract

A remote emissions sensing system is provided with NO<sub>x</sub> detection capability. First, a reading of the ambient NO<sub>x</sub> concentration is taken just prior to each vehicle passing through the system. This measurement accounts for any ambient NO<sub>x</sub> concentration that may be lingering  
5 from the exhaust of a previous vehicle. Next, the system takes a blocked reading when the vehicle is located in the path of the beam. This reading accounts for any ambient or system noise that may exist. Finally, the system takes a reading of the exhaust plume as the beam passes through the plume. A processor determines the portion of the reading due to the exhaust plume by subtracting the ambient and blocked readings from the exhaust plume reading. As a result, a  
10 more accurate exhaust concentration reading is provided. Additionally, the system may process exhaust plume readings only in a predetermined wavelength band associated with the known absorption spectrum of NO<sub>x</sub> so that data points for which there is no significant absorption of NO<sub>x</sub> may be eliminated. Thus, any noise or other interference in the non-absorptive wavelengths are minimized. Also, changes in the intensity of the radiation are compensated by subtracting a  
15 baseline intensity from each signal.

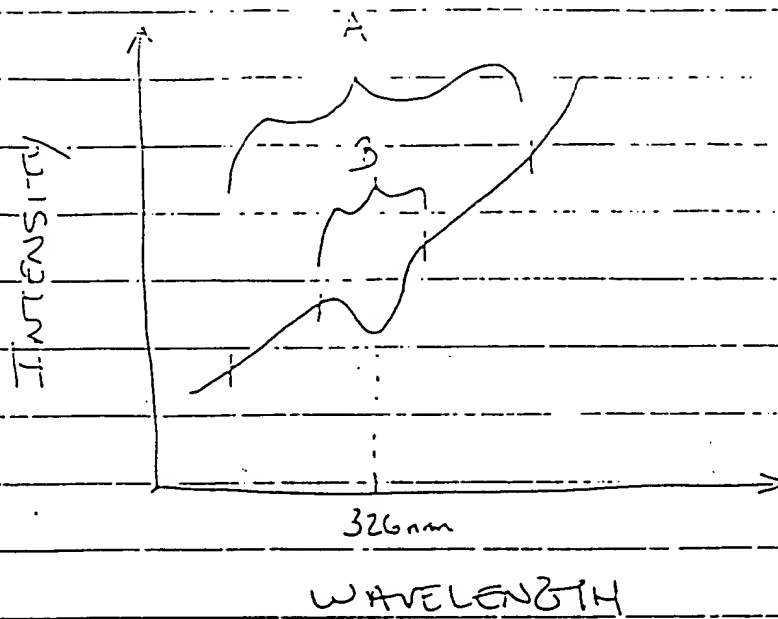


FIG. 1

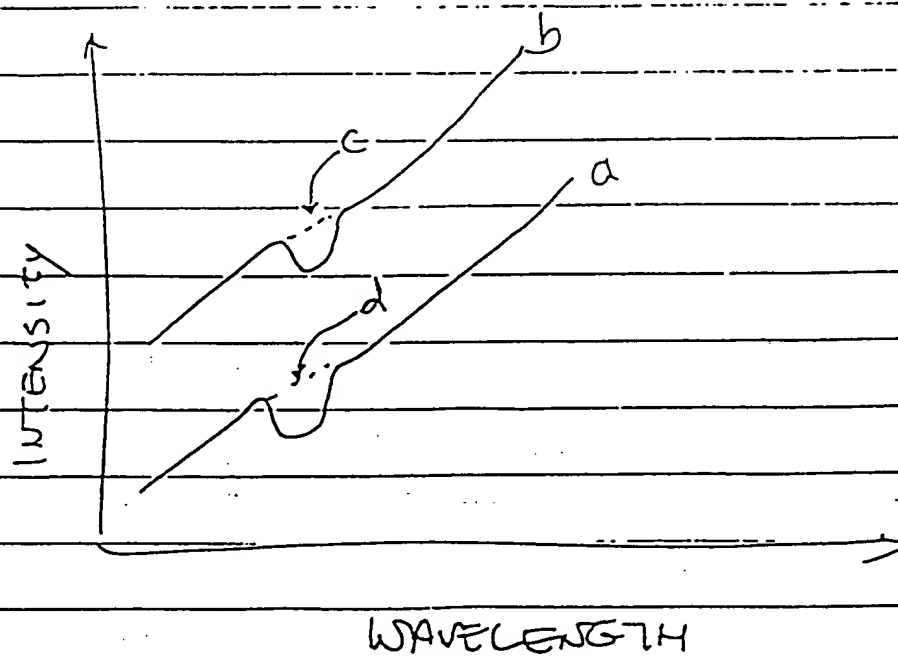


FIG. 2.

# JOINT DECLARATION FOR PATENT APPLICATION

As the below named inventors, we hereby declare that:

Our residence, post office addresses and citizenship are as stated below next to our names;

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION**, the specification of which

( ) is attached hereto.

(X) was filed on **November 13, 2000** as Application Serial Number **09/709,935** and was amended on

(if applicable)

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

## Prior Foreign Application(s)

We hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

C untry	Application Number	Date of Filing (day, month, year)	Date of Issue (day, month, year)	Priority Claimed Under 35 U.S.C. 119
				Yes <input type="checkbox"/> No <input type="checkbox"/>
				Yes <input type="checkbox"/> No <input type="checkbox"/>

## Prior United States Provisional Application(s)

We hereby claim the benefit under 37 C.F.R. §119(e) of any United States provisional application(s) listed below:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
60/100,913	09-17-1998	Pending

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

Prior United States Application(s)

We hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
09/398,199	09-17-1999	Abandoned
09/520,166	03-07-2000	Abandoned

I hereby appoint the attorneys and/or agents associated with Mintz Levin Cohn Ferris Glovsky & Popeo,

Customer Number

29315

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Please address all telephone calls to **James G. Gatto** at telephone number 703-464-4800.

Please address all correspondence to Customer number:

29315

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of Second Inventor      **JOHNSON**      **James**      \_\_\_\_\_  
    Family Name      First Given Name      Second Given Name

Residence      **4401 W. Crestview Road, Tucson, Arizona 85745**

Citizenship      **U.S.A.**

Post Office Address      **Same as above**

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of First Inventor      **DIDOMENICO**      **John**      \_\_\_\_\_  
    Family Name      First Given Name      Second Given Name

Residence      **8810 East Bear Paw Place, Tucson, Arizona 85749**

Citizenship      **U.S.A.**

Post Office Address      **Same as above**

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of First Inventor      **Rendahl**      **Craig**      **S.**  
    Family Name      First Given Name      Second Given Name

Residence      **9307 N. Desert Monsoon Pl., Marana, Arizona 85743-7533**

Citizenship      **U.S.A.**

Post Office Address      **Same as above**

RES 98564v1

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
 12010 Sunset Hills Road, Suite 900  
 Reston, VA 20190  
 703-464-4800  
 fax: 703-464-4895

**ASSIGNMENT**

WHEREAS, **James Johnson**, a citizen of the United States of America, residing at 4401 W. Crestview Road, Tucson, AZ 85745; **John DiDomenico**, a citizen of the United States of America, residing at 8810 East Bear Paw Place, Tucson, AZ 85749; and **Craig S. Rendahl**, a citizen of the United States of America, residing at 9307 N. Desert Monsoon Pl., Marana, AZ 85743-7533 (hereinafter "Assignor" or "Assignors"), have made an invention entitled:

**"REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION"**  
described in the application for United States Letters Patent filed on November 13, 2000, and assigned **U.S. Application Serial No. 09/709,935**; and

WHEREAS, **Environmental Systems Products Holdings Inc.** (hereinafter "Assignee"), a Delaware corporation having a place of business at 11 Kripes Road, East Granby, Connecticut 06026, is desirous of acquiring the entire right, title and interest in and to the aforesaid invention, applications and all Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor;

NOW THEREFORE, in consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the said assignors, by these presents do sell, assign and transfer unto Assignee, its successors, legal representatives and assigns, the full and exclusive right in and to the said invention as described in the said application, and in and to any Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor and all rights to claim priority on the basis of said application;

AND WE HEREBY authorize and request the Commissioner of Patents and Trademarks or any other proper officer or agency of any country to issue all said Letters Patent to said Assignee;

AND WE HEREBY warrant and covenant that we have the full right to convey the entire interest herein assigned and that we have not executed and will not execute any instrument or assignment in conflict herewith;

AND WE HEREBY authorize any attorney and/or agent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, PC, to insert any information necessary to ensure that this Assignment is complete upon submission to the United States Patents and Trademark Office;

AND WE HEREBY agree to communicate to said Assignee or its representatives any facts known to us respecting said invention, to execute all divisional, continuation, reissue, reexamination, extension, substitute and foreign applications, sign all lawful documents and make all rightful oaths and declarations relating to said invention, execute and deliver any and all papers that may be necessary or desirable to perfect the title to this invention in said Assignee, its successors, legal representatives or assigns, and to testify in any judicial or administrative proceeding and generally do everything possible to aid the said Assignee to obtain and enforce said Letters Patent in the United States or any foreign country when requested so to do by said Assignee.



Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**James Johnson**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **James Johnson**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_



Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**Craig S. Rendahl**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **Craig S. Rendahl**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

RES 98561v1

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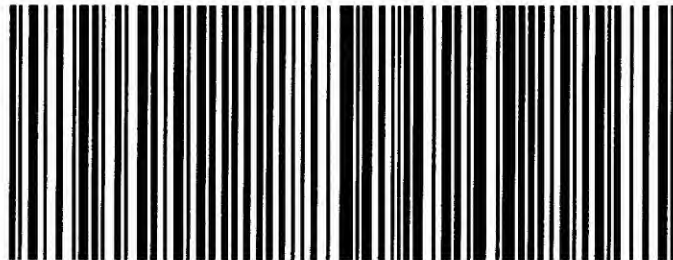
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Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

12010 Sunset Hills Road, Suite 900  
Reston, Virginia 20190-5839

Bradford C. Blaise, Esq.

Direct dial 703 464 8130  
bcblaise@mintz.com

703 464 4800  
703 464 4895 fax

August 5, 2003

Via Federal Express

CONFIDENTIAL

Mr. John DiDomenico  
8810 East Bear Paw Place  
Tucson, Arizona 85749

Re: U.S. Patent Application  
Serial No.: 09/709,935  
Inventor(s): John DiDomenico, Craig S. Rendahl, James Johnson  
Title: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION"  
Filed: November 13, 2000

Dear Mr. DiDomenico,

As you know, Environmental Systems Products Holdings Inc. (ESPH) has filed a series of patent applications for which you are a named inventor.

In particular, the above-referenced patent application was filed with the U.S. Patent Office on November 13, 2000 naming you as an Inventor. A copy of the above-referenced patent application, as-filed, is enclosed for your review.

Also enclosed are: (1) Joint Declaration and Power of Attorney; and (2) Assignment. At this time, we request that you execute the Declaration and Power of Attorney and Assignment documents, and return them to us as soon as possible for filing with the U.S. Patent and Trademark Office. For your convenience, I have enclosed a self-addressed Federal Express envelope for expeditious return.

Patent rights and the administrative procedures for securing patent rights are costly and time sensitive. Any delay on your part may generate additional expenses for ESPH and could jeopardize the company's valuable patent rights. I also remind you of your continuing duty, pursuant to your former employment, to assist ESPH in securing its rights. Accordingly, we request a response by Wednesday, August 20, 2003. If we receive no response from you by this date, we will consider it a refusal to sign.

Reston Boston New York Washington New Haven

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.

Mr. John DiDomenico

August 5, 2003

Page 2

If you have any questions regarding this matter, please do not hesitate to contact me at the telephone number listed above.

Very truly yours,

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.



Bradford C. Blaise, Esq.

BCB/mrs

Enclosures:

- Copy of U.S. Patent Application Serial No. 09/709,935 titled: "REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION," including drawing figures 1-2.
- Joint Declaration for Patent Application and Power of Attorney
- Assignment
- Federal Express Return Envelope

RES 98559v1

## REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION

### Field of the Invention

Remote emissions sensing system and method with improved nitrous oxide (NO<sub>x</sub>) detection, including processing to account for the presence of ambient NO<sub>x</sub>.

### Background of the Invention

5 Remote emissions sensing systems generally are known. One such system comprises a source of electromagnetic radiation arranged to pass a beam of radiation through the exhaust plume of a motor vehicle as the motor vehicle passes by the system, and one or more detectors arranged to receive the radiation after it passes through the exhaust plume of the vehicle. A filter may be associated with one or more detectors to enable the detector to determine the intensity of  
10 electromagnetic radiation having a particular wavelength or range of wavelengths. The wavelengths may be conveniently selected to correspond to wavelengths absorbed by molecular species of interest in an exhaust plume (e.g., HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, or other molecular species). The one or more detector output voltages that represent the intensity of the electromagnetic (em) radiation measured by that detector. The voltages are input to a processor. The processor  
15 calculates the difference between the known intensity of the light source and the intensity detected by the detectors to determine the amount of absorption by particular molecular species (based on predetermined wavelengths associated with that species). Based on the measured absorption(s), the concentration of one or more molecular species in the emissions may be



determined in a known manner. For various reasons, inaccuracies can occur when remotely sensing emissions.

Some remote emission sensing systems do not have the capability to detect NO<sub>x</sub>. Other systems detect NO<sub>x</sub>, but suffer from various drawbacks. One problem is that when detecting the NO<sub>x</sub> concentration present in an exhaust plume, the presence of ambient NO<sub>x</sub> can adversely affect the accuracy of the detected concentration. For example, if two cars pass a test station within a relatively short time period, NO<sub>x</sub> emissions from the first car may linger and be mixed with the exhaust plume of the second car thereby skewing the measurement of NO<sub>x</sub> concentration of the second car. Other sources of ambient NO<sub>x</sub> may lead to a similar result.

A second problem arises due to variations in light source intensity. Generally, to detect the NO<sub>x</sub> concentration in an exhaust plume, the output of a detector adapted to determine the amount of absorption of the light beam due to the presence of NO<sub>x</sub> is compared to a value indicative of the intensity of the light source, with the difference representing the amount of absorption due to the presence of NO<sub>x</sub>.

Typically, a standard value is used for the light source intensity. However, variations in the actual intensity of the source can cause inaccuracies in the detected amount of NO<sub>x</sub>. A third problem arises due to the presence of noise. Other problems and drawbacks exist.

#### Summary of the Invention

One object of the invention is to overcome these and other limitations, problems and drawbacks of prior systems and methods.

Another object of the present invention is to increase the reliability and accuracy of NO<sub>x</sub>

readings taken in a remote emissions sensing system.

Another object of the invention is to improve the accuracy of  $\text{NO}_x$  emissions readings by accounting for the presence of ambient  $\text{NO}_x$ .

Another object of the invention is to improve the accuracy of  $\text{NO}_x$  emissions readings by accounting for the presence of ambient noise.

It is another object of the invention to improve the processing efficiency of  $\text{NO}_x$  concentration calculations.

These and other objects of the invention are accomplished according to various embodiments of the present invention. According to one embodiment of the present invention a remote emissions sensing system is provided with  $\text{NO}_x$  detection capability. Ideally, the  $\text{NO}_x$  detected is the  $\text{NO}_x$  present in the exhaust plume emanating from a motor vehicle being tested. To account for ambient  $\text{NO}_x$  (for example, from a previous car), for each vehicle whose exhaust is measured, an ambient  $\text{NO}_x$  concentration reading is taken. Preferably, a "blocked" beam reading is also taken prior to exhaust plume measurement. The ambient and blocked beam readings are both subtracted from the exhaust plume reading to render a more accurate exhaust concentration reading.

Additionally, the system may be configured to process exhaust plume readings only in a predetermined wavelength band associated with the known absorption spectrum of  $\text{NO}_x$ .

The above and other objects, features and advantages of the present invention will be better understood from the following detailed description of the invention.

#### Brief Description of the Drawings

Figure 1 depicts a schematic representation of intensity versus wavelength data for one embodiment of the invention.

Figure 2 depicts a schematic representation of intensity versus wavelength data for another one embodiment of the invention.

5    Detailed Description of the Invention

According to one embodiment, the emissions detection may be performed by a remote sensing device, such as RSD-1000 or RSD-2000, manufactured by RSTi, Tucson, Arizona.

Typically, the remote sensing device and analyzer system includes at least one source of radiation (*e.g.*, infrared (IR), ultra-violet (UV), etc.), at least one detector of radiation, and a  
10   processor to process the detected radiation signals. According to one embodiment of the invention, the radiation emitted by the source(s) may be directed across a roadway along a predetermined path. In some embodiments, additional optics or beam directing devices may be used to re-direct the beam of radiation. Ultimately, the source radiation is received by the detector(s). Other system configurations may also be used. When a vehicle passes along  
15   roadway, the source beam(s) may pass through an exhaust plume of the vehicle.

The detector(s) record the presence of various exhaust constituents (*e.g.*, HC, CO<sub>2</sub>, CO, NO<sub>x</sub>, etc.), typically, by recording a voltage level indicative of the amount of absorption of the source beam. The processor, in part, performs an analysis of the plume to analyze the exhaust emissions in a known manner.

20       According to one embodiment of the present invention, the remote emission detector (RSD) system takes a reading of the ambient NO<sub>x</sub> concentration present just prior to each vehicle passing through the system. As the vehicle is passing through the system, the RSD system takes

a "blocked" reading (*i.e.*, a reading when the vehicle is located in the path of the beam between the source and detector). This reading may reflect any ambient or system noise which may be present. The RSD system also takes a reading of the exhaust plume as the beam passes through the plume. Thus, in accordance with a one embodiment of the present invention, for each vehicle  
5 whose NO<sub>x</sub> reading is to be taken, at least three measurements are made, including an ambient concentration reading, a "blocked" reading and an exhaust plume reading. Since the ambient concentration and noise can vary from test to test, detecting the ambient NO<sub>x</sub> concentration and noise for each test can permit more accurate and reliable NO<sub>x</sub> concentration determinations to be made.

10 Each of the readings is made by one or more detectors. The outputs of the detector(s), reflecting the ambient NO<sub>x</sub> reading, the blocked beam reading and the exhaust plume reading (and other desired data), are provided to a processor. The processor determines the ambient concentration of NO<sub>x</sub> and the concentration of NO<sub>x</sub> from the exhaust plume and subtracts the ambient concentration from the NO<sub>x</sub> concentration from the plume for each vehicle tested.

15 Preferably, the blocked beam reading for each vehicle is subtracted from the exhaust plume reading for that vehicle to remove ambient and or system noise to further improve the accuracy and or reliability of the test results.

Each of the readings and the process and system for obtaining reliable NO<sub>x</sub> readings in connection with a remote sensing system will now be discussed in more detail. Initially, as the  
20 vehicle approaches the light beam, the baseline ambient concentration reading is taken. In connection with this step the detector measures the ambient NO<sub>x</sub> concentration just prior to the vehicle's entry into and through the light beam. The baseline ambient concentration readings

may be scheduled to occur periodically when no vehicle or emissions source is within detection range. Thus, the most recent reading for ambient concentration may be stored and used in connection with the concentration calculation for each vehicle. Alternatively, a trigger event may cause the RSD system to take the ambient concentration reading. In either case, the readings are preferably obtained by taking a plurality of samples at short intervals over a predetermined measurement interval. For example, an ambient reading may comprise 50 samples at 10 ms intervals over a 0.5 second measurement interval.

Once a vehicle breaks the light beam, a "blocked" reading or "dark current" reading, may be performed. This reading measures baseline current and noise in the system. The baseline values may change during the course of the day as it is dependent upon, for example, ambient temperature. The "blocked" reading is taken for each vehicle for which an  $\text{NO}_x$  reading is desired. Preferably, the blocked reading is taken after the ambient concentration reading but prior to the exhaust plume reading. The exhaust plume reading is taken based upon the actual emissions from each vehicle to be measured, in a known manner.

One embodiment of the present invention incorporates certain data processing routines conveniently chosen to increase the accuracy and validity of resulting  $\text{NO}_x$  concentrations.

Figure 1 depicts a typical data plot that may result from an absorption measurement of  $\text{NO}_x$ . The Y axis contains radiation intensity values and the X axis contains radiation wavelength values.

An absorption of radiation will typically appear as a dip in the signal at particular wavelengths.

For example, absorption of NO will typically occur centered substantially around wavelengths of 326 nm. In a known manner, exhaust emission data is typically normalized or ratioed by comparison with another exhaust constituent (e.g.,  $\text{CO}_2$ ). Certain existing systems may ratio

using data corresponding to a range of wavelengths indicated by bracket A on Fig. 1. As can be seen, this range includes many data points for which there is no significant absorption of  $\text{NO}_x$ .

Thus, any noise or other inaccuracies present in these non-absorptive wavelengths may lead to erroneous results in determining the concentration of  $\text{NO}_x$  in the exhaust emissions. The present invention reduces errors of this sort by selecting a convenient range of wavelengths over which to ratio. For example, as shown in Fig. 1, a range of wavelengths, indicated by bracket B and substantially centered around an absorption dip may be used to calculate a ratio.

The present invention also compensates for changes in the intensity of the radiation to calculate a more accurate  $\text{NO}_x$  concentration. Fig. 2 depicts two absorption signals (indicated as "a" and "b" in Fig. 2) for two measurements of  $\text{NO}_x$  concentration. The apparent shift in the curves may be caused by a variety of reasons. For example, as ambient conditions (*e.g.*, air temperature, humidity, etc.) change, the intensity may also change and cause a shift in the detected signal. The present invention compensates for such an effect by subtracting a baseline intensity from each signal. The baseline intensity may be calculated by a variety of methods. For example, a substantially linear region (indicated as "c" and "d" on Fig. 2) may be used to obtain a baseline intensity level. Thus, each measurement will preferably have a baseline corresponding to the identical conditions during which the measurement was taken and a more accurate determination of  $\text{NO}_x$  concentration may be calculated.

Other embodiments and uses of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. The specification and examples should be considered exemplary only.

I claim:

1. A method for remote emissions sensing with NO<sub>x</sub> detection capability comprising the steps of:

taking an ambient reading of ambient NO<sub>x</sub> concentration present prior to a vehicle

5 passing by a system for remote emissions sensing;

taking an exhaust plume reading of an exhaust plume of the vehicle as the vehicle passes by the system for remote emissions sensing; and

subtracting the ambient NO<sub>x</sub> concentration reading from the exhaust plume reading to provide a concentration reading for the NO<sub>x</sub> present in the vehicle emissions.

10 2. The method of claim 1 further comprising the steps of taking a blocked beam reading prior to taking an exhaust plume reading and when the vehicle is in the path of a source beam of the system; and

subtracting the blocked beam reading from the exhaust plume reading.

15 3. The method of claim 2, wherein the ambient reading is taken at predetermined intervals and wherein the most recent reading is stored and used in connection with the blocked beam and exhaust plume readings for each vehicle.

4. The method of claim 1, wherein the ambient reading is taken at an occurrence of a predetermined trigger event.

20 5. The method of claim 2, wherein the blocked beam reading measures baseline current or noise in the system and wherein the blocked beam reading is taken after the ambient reading but before the exhaust plume reading.

6. The method of claim 1, wherein a range of wavelengths substantially centered around a characteristic wavelength is selected over which to take readings so that the number of data points for which there is no significant NO<sub>x</sub> absorption is minimized.

7. The method of claim 1, further comprising the step of subtracting a baseline intensity from each exhaust plume reading to compensate for changes in radiation intensity.

8. The method of claim 6, wherein the baseline intensity is calculated using a substantially linear region over an absorption dip.

9. The method of claim 2, wherein the ambient reading is taken just prior to the blocked beam reading.

10. A system for remote emissions sensing with NO<sub>x</sub> detection capability comprising:  
a source beam of radiation;  
a means for taking an ambient reading of ambient NO<sub>x</sub> concentration present prior to a vehicle passing by the system;  
a means for taking an exhaust plume reading of an exhaust plume of a vehicle; and  
a means for subtracting the ambient NO<sub>x</sub> concentration reading from the exhaust plume reading.

11. A system as claimed in claim 10 further comprising a means for taking a blocked beam reading when the vehicle is in the path of the source beam; and  
a means for subtracting the blocked beam reading from the exhaust plume reading.

12. The system of claim 10, wherein the ambient reading is taken periodically at predetermined intervals and the most recent reading is stored and used in connection with the exhaust plume reading for each vehicle.



13. The system of claim 10, wherein the ambient reading is taken at the occurrence of a predetermined trigger event.

14. The system of claim 11, wherein the blocked beam reading measures baseline current or noise in the system, and where the blocked beam reading is taken after the ambient  
5 reading but before the exhaust plume reading.

15. The system of claim 10, wherein a range of wavelengths substantially centered around a characteristic wavelength is selected over which to take readings so that the number of data points for which there is no significant  $\text{NO}_x$  absorption is minimized.

16. The system of claim 10, wherein changes in the intensity of the source radiation are  
10 compensated by subtracting a baseline radiation intensity from each exhaust plume reading.

17. The system of claim 16, wherein the baseline intensity is calculated using a substantially linear region over an absorption dip.

Abstract

A remote emissions sensing system is provided with NO<sub>x</sub> detection capability. First, a reading of the ambient NO<sub>x</sub> concentration is taken just prior to each vehicle passing through the system. This measurement accounts for any ambient NO<sub>x</sub> concentration that may be lingering  
5 from the exhaust of a previous vehicle. Next, the system takes a blocked reading when the vehicle is located in the path of the beam. This reading accounts for any ambient or system noise that may exist. Finally, the system takes a reading of the exhaust plume as the beam passes through the plume. A processor determines the portion of the reading due to the exhaust plume by subtracting the ambient and blocked readings from the exhaust plume reading. As a result, a  
10 more accurate exhaust concentration reading is provided. Additionally, the system may process exhaust plume readings only in a predetermined wavelength band associated with the known absorption spectrum of NO<sub>x</sub> so that data points for which there is no significant absorption of NO<sub>x</sub> may be eliminated. Thus, any noise or other interference in the non-absorptive wavelengths are minimized. Also, changes in the intensity of the radiation are compensated by subtracting a  
15 baseline intensity from each signal.

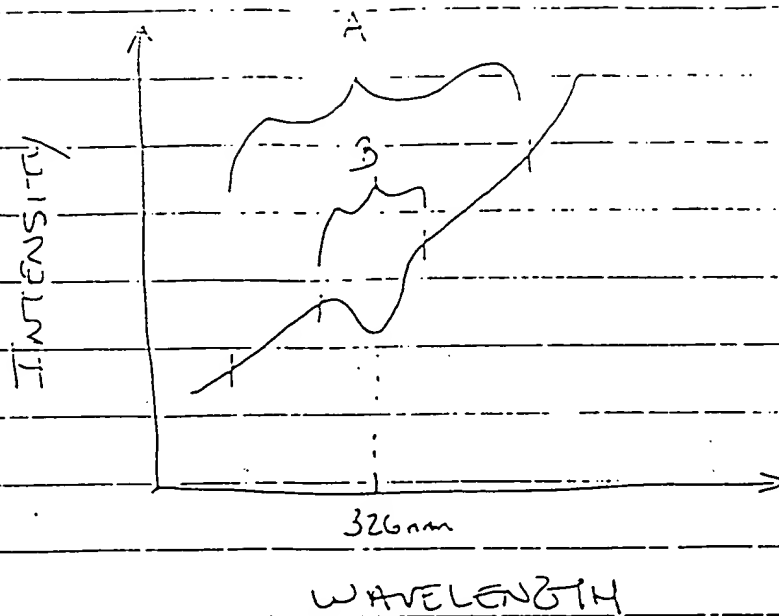


FIG. 1

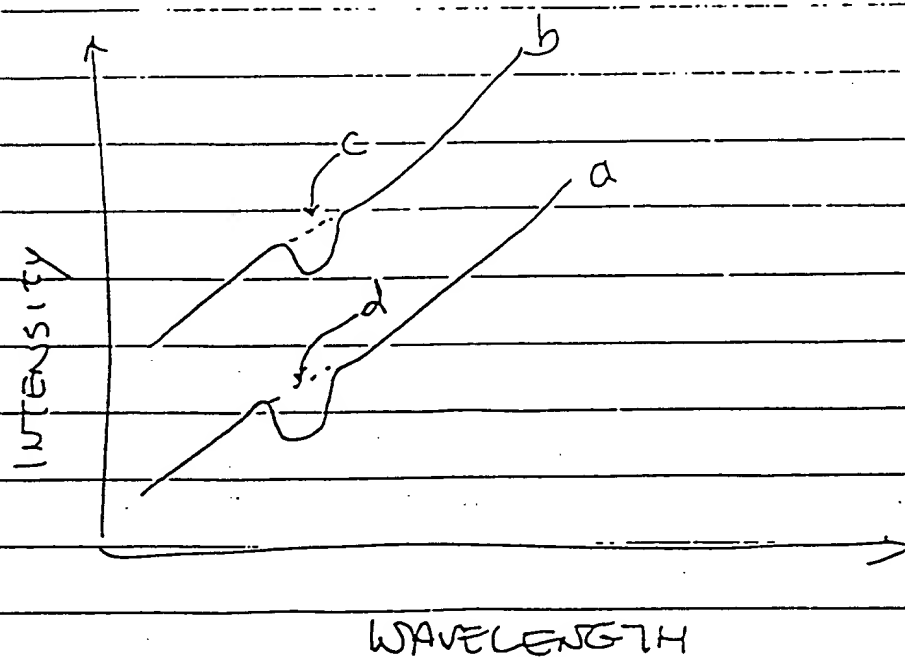


FIG. 2.

**JOINT DECLARATION FOR PATENT APPLICATION**

As the below named inventors, we hereby declare that:

Our residence, post office addresses and citizenship are as stated below next to our names;

We believe that we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION**, the specification of which

( ) is attached hereto.

(X) was filed on **November 13, 2000** as Application Serial Number **09/709,935** and was amended on

(if applicable)

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

**Prior Foreign Application(s)**

We hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Country	Application Number	Date of Filing (day, month, year)	Date of Issue (day, month, year)	Priority Claimed Under 35 U.S.C. 119
				Yes <input type="checkbox"/> No <input type="checkbox"/>
				Yes <input type="checkbox"/> No <input type="checkbox"/>

**Prior United States Provisional Application(s)**

We hereby claim the benefit under 37 C.F.R. §119(e) of any United States provisional application(s) listed below:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
60/100,913	09-17-1998	Pending

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

## Prior United States Application(s)

We hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Number	Date of Filing (day, month, year)	Status - Patented, Pending, Abandoned
09/398,199	09-17-1999	Abandoned
09/520,166	03-07-2000	Abandoned

I hereby appoint the attorneys and/or agents associated with Mintz Levin Cohn Ferris Glovsky & Popeo,

Customer Number

29315

to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

---

Please address all telephone calls to **James G. Gatto** at telephone number 703-464-4800.

Please address all correspondence to Customer number:

29315

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of  
Second Inventor      **JOHNSON**      **James**      \_\_\_\_\_  
Family Name      First Given Name      Second Given Name

Residence      **4401 W. Crestview Road, Tucson, Arizona 85745**

Citizenship      **U.S.A.**

Post Office  
Address      **Same as above**

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of  
First Inventor      **DIDOMENICO**      **John**      \_\_\_\_\_  
Family Name      First Given Name      Second Given Name

Residence      **8810 East Bear Paw Place, Tucson, Arizona 85749**

Citizenship      **U.S.A.**

Post Office  
Address      **Same as above**

Signature \_\_\_\_\_ Date \_\_\_\_\_

Full Name of  
First Inventor      **Rendahl**      **Craig**      **S.**  
Family Name      First Given Name      Second Given Name

Residence      **9307 N. Desert Monsoon Pl., Marana, Arizona 85743-7533**

Citizenship      **U.S.A.**

Post Office  
Address      **Same as above**

RES 98564v1

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo  
12010 Sunset Hills Road, Suite 900  
Reston, VA 20190  
703-464-4800  
fax: 703-464-4895

**ASSIGNMENT**

WHEREAS, **Jam s Johnson**, a citizen of the United States of America, residing at 4401 W. Crestview Road, Tucson, AZ 85745; **John DiDomenico**, a citizen of the United States of America, residing at 8810 East Bear Paw Place, Tucson, AZ 85749; and **Craig S. Rendahl**, a citizen of the United States of America, residing at 9307 N. Desert Monsoon Pl., Marana, AZ 85743-7533 (hereinafter "Assignor" or "Assignors"), have made an invention entitled:

**"REMOTE EMISSIONS SENSING SYSTEM WITH IMPROVED NO<sub>x</sub> DETECTION"**

described in the application for United States Letters Patent filed on November 13, 2000, and assigned **U.S. Application Serial No. 09/709,935**; and

WHEREAS, **Environmental Systems Products Holdings Inc.** (hereinafter "Assignee"), a Delaware corporation having a place of business at 11 Kripes Road, East Granby, Connecticut 06026, is desirous of acquiring the entire right, title and interest in and to the aforesaid invention, applications and all Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor;

NOW THEREFORE, in consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the said assignors, by these presents do sell, assign and transfer unto Assignee, its successors, legal representatives and assigns, the full and exclusive right in and to the said invention as described in the said application, and in and to any Letters Patent of the United States or any foreign country, including continuations, continuations-in-part, reissues, reexaminations, extensions, substitutes and divisions which may be granted therefor and all rights to claim priority on the basis of said application;

AND WE HEREBY authorize and request the Commissioner of Patents and Trademarks or any other proper officer or agency of any country to issue all said Letters Patent to said Assignee;

AND WE HEREBY warrant and covenant that we have the full right to convey the entire interest herein assigned and that we have not executed and will not execute any instrument or assignment in conflict herewith;

AND WE HEREBY authorize any attorney and/or agent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, PC, to insert any information necessary to ensure that this Assignment is complete upon submission to the United States Patents and Trademark Office;

AND WE HEREBY agree to communicate to said Assignee or its representatives any facts known to us respecting said invention, to execute all divisional, continuation, reissue, reexamination, extension, substitute and foreign applications, sign all lawful documents and make all rightful oaths and declarations relating to said invention, execute and deliver any and all papers that may be necessary or desirable to perfect the title to this invention in said Assignee, its successors, legal representatives or assigns, and to testify in any judicial or administrative proceeding and generally do everything possible to aid the said Assignee to obtain and enforce said Letters Patent in the United States or any foreign country when requested so to do by said Assignee.



Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**James Johnson**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **James Johnson**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires:

\_\_\_\_\_

Signature of Inventor:  
Inventor's Name:

\_\_\_\_\_  
**John DiDomenico**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)  
) ss:  
)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **John DiDomenico**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

Signature of Inventor:

Inventor's Name:

\_\_\_\_\_  
**Craig S. Rendahl**

Date of Execution:

\_\_\_\_\_

IN WITNESS WHEREOF, I have hereunto set my hand and seal.

County of

)

) ss:

)

On this \_\_\_\_\_ day of \_\_\_\_\_, 2003, before me a Notary Public in and for the County and State aforesaid, personally appeared **Craig S. Rendahl**, to me know to be the person whose name is subscribed to the within instrument and acknowledged that he executed it of his own free act and deed.

(SEAL)

\_\_\_\_\_  
Notary Public

My commission expires: \_\_\_\_\_

RES 98561v1

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4:47 am	Left FedEx Sort Facility	MEMPHIS TN	
4:35 am	Arrived at FedEx Ramp	TUCSON AZ	
12:31 am	Arrived at Sort Facility	MEMPHIS TN	
Aug 5, 2003 10:44 pm	Left FedEx Ramp	DULLES VA	
9:31 pm	Left FedEx Origin Location	HERNDON VA	
9:30 pm	Arrived at FedEx Ramp	CHANTILLY VA	
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August 11, 2003

Dear Mr. Blaise,

Attached is a copy of a letter sent to C. J. Cuneo of Mintz, etc.. The last three paragraphs state my intent in reviewing applications for ESP. Though my agreement with ESP states the requirement to assist in patent issues, it does not state that I would be required to do this without compensations.

Over the past three, I've been more than accommodating in these reviews. If you would like for me to quote a cost for reviewing the current application or any future application, please indicate as such in future correspondence.

Sincerely,

John DiDomenico

A handwritten signature in dark ink, consisting of a large, stylized 'J' and 'D' that loop together, followed by a long, horizontal, wavy line extending to the right.

February 13, 2002

To: C. J. Cuneo  
Mintz Levin, Cohn Ferris, etc.

From: John DiDomenico  
Re: Preliminary Review of Patent Application .

REDACTED

I've reviewed both the claims and the body of the patent application. The following are my comments.

REDACTED

REDACTED

REDACTED

REDACTED

Further, I've been doing these patent reviews for over two year for free. If I were still at ESP I would not be reviewing these application on my personnel time. I also feel that most of these applications were not well researched by your firm (and the previous firm) for past prior art and that you are relying on the inventors to do your research.

At the original patent meeting in 1998 in which we discussed potential applicable patent application, it was defined as the responsibility of the patent lawyers to do the research on the applications for patent ability and prior art and therefore limit inventing engineers involvement. This has not been done.

In the future I will review future applications but will I insist on getting paid reasonability compensation for that review. If you send me an application for review, I will summit an exact cost and schedule for the review. When I receive that compensation, I will execute the review per the defined schedule.

Sincerely,

John DiDomenico

A large, stylized handwritten signature in black ink, consisting of several loops and a long horizontal flourish extending to the right.

**Blaise, Bradford**

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**From:** Blaise, Bradford  
**Sent:** Tuesday, November 18, 2003 3:44 PM  
**To:** 'Patent Technical Writing from Craig S. Rendahl'; 'jdidomenico@meicompany.com';  
'jdidomenicosprint@earthlink.net'  
**Cc:** Gatto, James  
**Subject:** Confidential

Greetings Craig and John -

ESP has agreed to enable us to pursue a Consulting Agreement with each of you, whereby you would each be paid an hourly fee to assist us on certain patent matters. In particular, services under the consulting agreement may include, for example, reviewing ESP patent applications for content and technical accuracy, and/or analyzing references cited by Patent Examiners in pending patent applications.

If possible, Jim Gatto and I would like to schedule a group telephone conference with you so that we may cover what the Agreement entails, and address any questions or concerns you may have. I realize that it may be difficult to coordinate a convenient time for all with the approaching Thanksgiving holiday, but tomorrow (Wed. Nov. 19) in the late afternoon (east coast time) would work for us, as well as anytime this Friday (Nov. 21). If you could each let me know your availability during these times, I would certainly appreciate it.

Best Regards,

Brad

---

Bradford C. Blaise, Esq.  
Mintz Levin Cohn Ferris Glovsky and Popeo PC  
12010 Sunset Hills Road  
Suite 900  
Reston, VA. 20190  
(Main) 703.464.4800  
(Direct) 703.464.8130  
(Fax) 703-464-4895

11/24/2003



**Blaise, Bradford**

---

**From:** John DiDomenico [jdidomenico@meicompany.com]  
**Sent:** Thursday, November 20, 2003 10:13 AM  
**To:** Blaise, Bradford; Patent Technical Writing from Craig S. Rendahl; jdidomenicosprint@earthlink.net  
**Cc:** Gatto, James  
**Subject:** Re: Confidential

Dear Mr. Blaise,

I would suggest that the first step should be to send out whatever form of the agreement you may have at this time for my review. I will review and respond in writing with questions then those and other questions submitted by other participants will be the basis for our verbal discussions.

Sincerely,  
John DiDomenico

----- Original Message -----

**From:** Blaise, Bradford  
**To:** Patent Technical Writing from Craig S. Rendahl ; jdidomenico@meicompany.com ; jdidomenicosprint@earthlink.net  
**Cc:** Gatto, James  
**Sent:** Tuesday, November 18, 2003 1:43 PM  
**Subject:** Confidential

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## Blaise, Bradford

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**From:** Blaise, Bradford  
**Sent:** Thursday, November 20, 2003 11:30 AM  
**To:** 'John DiDomenico'; Patent Technical Writing from Craig S. Rendahl;  
jdidomenicosprint@earthlink.net  
**Cc:** Gatto, James  
**Subject:** RE: Confidential

Greetings John and Craig -

Per John's e-mail (below), I am attaching a draft of the proposed Consulting Agreement as an Adobe \*.pdf file. If you have difficulty opening the attachment, please let me know.

Briefly, the Agreement proposes an arrangement whereby your Services would be requested and performed on a matter by matter basis. The Agreement sets forth the first matter (or Services) in "Schedule A."

Please review this Agreement carefully. Jim and I look forward to answering any questions or addressing any concerns that you may have.

We look forward to hearing from you.

Best Regards,

Brad

-----Original Message-----

**From:** John DiDomenico [mailto:jdidomenico@meicompany.com]  
**Sent:** Thursday, November 20, 2003 10:13 AM  
**To:** Blaise, Bradford; Patent Technical Writing from Craig S. Rendahl; jdidomenicosprint@earthlink.net  
**Cc:** Gatto, James  
**Subject:** Re: Confidential

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**Cc:** Gatto, James  
**Sent:** Tuesday, November 18, 2003 1:43 PM  
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**Blaise, Bradford**

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**From:** John DiDomenico [jdidomenico@meicompany.com]  
**Sent:** Thursday, November 20, 2003 5:59 PM  
**To:** Blaise, Bradford; Patent Technical Writing from Craig S. Rendahl  
**Cc:** Gatto, James  
**Subject:** Re: Confidential

Dear Mr. Blaise,

After reading the agreement, I find the agreement markedly restrictive and confining. And therefore I have no interest in going forward with this agreement at this time.

Sincerely,  
John DiDomenico

----- Original Message -----

**From:** Blaise, Bradford  
**To:** John DiDomenico ; Patent Technical Writing from Craig S. Rendahl ; jdidomenicosprint@earthlink.net  
**Cc:** Gatto, James  
**Sent:** Thursday, November 20, 2003 9:30 AM  
**Subject:** RE: Confidential

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11/24/2003

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John DiDomenico

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**From:** Blaise, Bradford

**To:** Patent Technical Writing from Craig S. Rendahl ; [jdidomenico@meicompany.com](mailto:jdidomenico@meicompany.com) ;  
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